CLAIMS

1. Device for non-invasive ultrasound treatment of an object, wherein at least two therapeutic ultrasound transducers (2a, 2b) are arranged for treatment of the object (5) by generating at least one ultrasonic field (3), the temperature focus (F) of which can be located in the object (5), and wherein a diagnostic ultrasound transducer (8) is arranged to determine the acoustic properties of the patient's (4) tissue (10) between the area on which said therapeutic ultrasound transducers (2a, 2b) are to be located for treatment and the object (5) to be treated to, in dependence of the acoustic properties determined by the diagnostic ultrasound transducer (8), adjust said therapeutic ultrasound transducers (2a, 2b) relative to the object (5) to be treated, **characterized in** that said therapeutic ultrasound transducers (2a, 2b) are locatable in different positions relative to each other and in such position relative to the object (5) to be treated that they together can generate the ultrasonic field (3) and its temperature focus (F) in said object (5), that said therapeutic ultrasound transducers (2a, 2b) are controllable for generating an ultrasonic field (3) with such intensity that tissue close to the object (5) is not exposed to tissue harmful temperatures, and that said therapeutic ultrasound transducers (2a, 2b) are controllable in order to be able to vary the distance between the same and the temperature focus (F) of the ultrasonic field (3).

2. Device according to claim 1, **characterized in** that the diagnostic ultrasound transducer (8) cooperates with a computer (29) comprising at least one software arranged to calculate appropriate setting of said therapeutic ultrasound transducers (2a, 2b) in dependence of the acoustic properties determined by the diagnostic ultrasound transducer (8), such that said temperature focus (F) can be brought to be achieved in the object (5) to be treated, whereby said software can alternatively or in combination with above mentioned setting of said therapeutic ultrasound transducers (2a, 2b) be arranged to calculate the position of the temperature focus (F) of said therapeutic ultrasound transducers (2a, 2b) in

dependence of said acoustic properties and said therapeutic ultrasound transducers (2a, 2b) setting with regard to its focussing properties, such that said therapeutic ultrasound transducers (2a, 2b) can be positioned such that said temperature focus (F) is achieved in the object (5) to be treated.

3. Device according to claim 2, **characterized in** that said computer (29) comprises at least one software arranged to calculate the heating effect of said therapeutic ultrasound transducer's (2a, 2b) ultrasonic field (3) in its temperature focus (F) in dependence of the acoustic properties determined by the diagnostic ultrasound transducer (8).

4. Device according to any preceding claim, **characterized in** that the diagnostic ultrasound transducer (8) is arranged to determine the thickness of different tissue layer of said tissue (10) in order to determine the acoustic properties thereof.

5. Device according to any preceding claim, **characterized in** that the diagnostic ultrasound transducer (8) is arranged to produce an image of said tissue (10).

6. Device according to any preceding claim, **characterized in** that the diagnostic ultrasound transducer (8) comprises transmitter elements of phased array type in order to vary the length of its ultrasound radiation.

7. Device according to any preceding claim, **characterized in** that said therapeutic ultrasound transducer (2a, 2b) cooperates with an optical navigating device (14) comprising at least one diagnostic camera (15) adapted to produce at least one image of the anatomic structure (17) of the treatment area (16) within which the object (5) to be treated is located and in that the optical navigation device (14) further comprises at least one signal receiving or signal sending unit (25) adapted to receive signals from or send signals to position transmitters (24, 7) on

a) a reference device (21) which has a fixed position relative to the object

(5), and

b) said therapeutic ultrasound transducer (2a, 2b) such that the position thereof relative to said treatment area (16) can be determined.

8. Device according to any preceding claim, **characterized in** that the diagnostic ultrasound transducer (8) comprises position transmitters (12) cooperating with the signal receiving or signal sending unit (25).

9. Device according to claim 7 or 8, **characterized in** that the signal receiving or signal sending unit (25) is arranged to receive or send signals in the form of infrared light or visible light or radio frequency electromagnetic waves or acoustic waves and that said position transmitters (7, 24) are arranged to send or receive signals in the form of infrared light or visible light or radio frequency electromagnetic waves or acoustic waves.

10. Device according to claim 9, **characterized in** that the diagnostic camera (15) is an X-ray camera (18).

11. Device according to claim 10, **characterized in** that the X-ray camera (18) comprises a positioning device (19) with markers (20) which are intended to determine the position of the anatomical structure (17) of the treatment area (16) displayed in a monitor (13).

12. Device according to claim 11, **characterized in** that the monitor (13) is arranged to display two X-ray photographs of said anatomical structure (17) taken with the X-ray camera (18) from two different locations.

13. Device according to claim 7, **characterized in** that the diagnostic camera (15) is a computerized tomography (CT) scanner which is arranged to produce images of the anatomical structure (17) at the patient's (4) object (5), which images are processed in a computer program (software) for obtaining a 3D-image in a

monitor (13).

14. Device according to claim 7, **characterized in** that the diagnostic camera (15) is a X-ray camera or a MRI scanner which is arranged to produce images of the anatomical structure (17) at the patient's (4) object (5), which images are processed in a computer program (software) for obtaining a 3D-image in a monitor (13).

15. Device according to any preceding claim, **characterized in** that the ultrasound transmitting device (2) comprises at least one therapeutic ultrasound transducer (2a, 2b) arranged to be positioned manually by means of calculated determination of the temperature focus (F) of said therapeutic ultrasound transducer's (2a, 2b) ultrasonic field (3) relative to said therapeutic ultrasound transducer's (2a, 2b) transmitter element (G).

16. Device according to any of claim 1 - 14, **characterized in** that the ultrasound transmitting device (2) comprises at least one therapeutic ultrasound transducer (2a, 2b) arranged at a positioning device (33) for positioning of the same relative the object (5) to be treated.

17. Device according to any preceding claim, **characterized in** that the ultrasound transmitting device (2) comprises at least one therapeutic ultrasound transducer (2a, 2b) comprising a transmitter element of phased array type in order to move the ultrasonic field (3) and its temperature focus (F).

18. Device according to any preceding claim, **characterized in** that the ultrasound transmitting device (2) is arranged to generate a temperature focus (F), the temperature of which exceeds 45°C.

19. Device according to any preceding claim, **characterized in** that a positioning device (19) is arranged for calibration of the power generated by said therapeutic

ultrasound transducer (2a, 2b) in the temperature focus (F) and/or the position of said temperature focus (F) relative to said therapeutic ultrasound transducer (2a, 2b).

20. Device according to claim 7, **characterized in** that the reference device (21) is arranged to be attached to a vertebra (22) in the patient's vertebral column, preferably to the spinal process (23) of said vertebra (22).

21. Device according to claim 7 or 20, **characterized in** that the reference device (21) comprises position transmitters (24) consisting of metallic balls, preferably tantalum balls.

22. Device according to claim 21, **characterized in** that the signal receiving or signal sending unit (25) of the optical navigating device (14) is at least one X-ray device.

23. Device according to any preceding claim, **characterized in** that said therapeutic and diagnostic ultrasound transducers (2a, 2b and 8) are co-located.

24. Device according to any of claims 1 - 22, **characterized in** that said therapeutic and diagnostic ultrasound transducers (2a, 2b and 8) are arranged at several locations.

25. Device according to any preceding claim, **characterized in** that the device is arranged for non-invasive ultrasound treatment of an object (5) in the form of nucleus pulposus (6) in the patient's (4) disc.

26. Device according to any preceding claim, **characterized in** that the device is arranged for non-invasive ultrasound treatment of an object (5) in the form of a ligament in a shoulder or a knee.

27. Use of a device according to any of the preceding claims, **characterized in** that it is used in methods for treatment of an object (5) in a patient's (4) body, such as for treatment of nucleus pulposus (6) in discs.

28. Use of a device according to any of claim 1 - 26, **characterized in** that it is used in methods for treatment of an object (5) in a patient's (4) body, such as ligaments in for example shoulders or knees.

29. Use of a device according to any of claim 1 - 26, **characterized in** that it is used in methods for treatment of an object (5) in a patient's (4) body, such as blood vessels.